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UNITED STATES FOREST SERVICE
REGION 6

GUIDE

for

FUEL TYPE

IDENTIFICATION

1968

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Region 6 - Fuel-Type Specifications:

Fuel-type system used in 1959 fire replanning embodies the best information currently available for rating R-6 fuels.

A reasonable amount of training and effort will enable personnel with widely different backgrounds to rate slash (and other) fuels consistently in the field using this system.

It appears most unprobable that prospective fuel appraisal systems will invalidate the existing fuel-types completely; rather, existing types are likely to remain useful examples within any future system.

Each fuel-type is defined by one of four rate-of-spread and one of four resistance-to-control classes, making sixteen possible fuel-type combinations. The four classes for both rate of spread and resistance to control are:

1. Extreme
2. High
3. Moderate
4. Low

These are abbreviated to - E, H, M, and L. Thus a type is designated by the symbol EH, LL, LH, etc., and referred to as an "Extreme High" type, etc.

Factors influencing rate of spread. Rate of spread should be estimated on the basis of the probable increase in perimeter of a small

fire under average worst day in the particular locality being typed. As the starting point in estimating rate of spread, a typical, slow-spreading fuel type; for example, the densely shaded Douglas-fir type condition where the ground is covered principally with moss and duff should be considered the standard Low condition and the rate of spread in all other fuel types compared to it. In other words, on a numerical basis this standard Douglas-fir type would have a value of 1 and an M rate of spread would have a value of 5; i.e., an M rate of spread would be approximately five times as fast, an H rate of spread would be approximately 25-times as fast, and an E rate of spread would be 125 or more times as fast.

The principal items to be watched in estimating rate of spread are:

1. Quantity of fuels (volume per given area).
2. Kind of fuels (coarse or fine, flashy or slow burning).
3. Arrangement of fuels (loose or compact, standing or down).
4. Slope of ground under fuels.
5. Degree of exposure of fuels to the sun (shade from true canopy, north or south aspect).
6. Normal exposure to wind.
7. Special items, such as snags, tree moss, bug-killed trees, and so forth, that affect the spread of fire.

Factors influencing resistance to control.

Since resistance to control is an estimate of

the units of manpower required to control a unit of fire perimeter, attention should be focused on all items that will consume the time of control-line building and holding crews. For example, a typical standard Low resistance-to-control fuel type would be a true fir-subalpine type free of down logs and with light duff or thin grass, a burned cutover area in the Douglas-fir region where brush, logs, and snags are not factors of consequence, or a Ponderosa Pine litter type with little brush. These should be kept in mind in the same way that the standard Low type condition is used in estimating rate of spread. Each class represents the units of manpower required to control a unit of fire perimeter, and the classes are in relationship to each other as follows:

1. Medium, twice as much work as Low.
2. High, four times as much work as Low.
3. Extreme, eight times as much work as Low.

The principal items to be considered in estimating resistance to control on an area are:

1. Ground cover conditions-low brush, weeds, vines, etc., that will slow up the rate of line construction.
2. Number and size of snags to be cut.
3. Number and size of windfalls that must be cut.
4. Amount of rotten wood and depth of duff and litter to mineral soil.
5. Brush poles and reproduction to be cut in control line clearing.
6. Soil conditions, rocks and roots as they affect digging.

7. Slope as it affects manpower production (should include only the effort required after reaching the fire).

In estimating resistance to control, handwork will be assumed. This includes the conventional handtools and the power saw.

For emphasis, it may be well to repeat that resistance to control applies to handling a small fire, and the estimate of work required should be on that basis and should not be concerned at all with methods which apply only to large fires. The duration of the work is the time required to corral a fire.

How to show fuel-type information on maps.

At least one set of complete fuel-type symbols must be shown for each fuel-type area. As a general rule, one set of symbols should be shown for each square inch of map surface according to the following scheme and always in the order specified:

1. First, symbol representing rate of spread; second, symbol representing resistance to control - for example, LM, MM, etc. (on first line).
2. Beneath this, abbreviation indicating Forest type - for example, D4-P4-FM2.
3. Next below, abbreviation indicating most important factor contributing to rate of spread.
4. Beneath this, abbreviation indicating most important factor contributing to resistance to control.
5. Next below, indicate the average prevailing percent of slope expressed in four classes as follows:

a. Extreme.....over 75%.
b. High.....50% to 75%.
c. Moderate.....25% to 50%.
d. Low.....0% to 25%.

6. Below this, indicate any special items such as machine shows, etc.

Example. (Abbreviations: E,H,M, and L):

1. HM (High rate of spread - moderate resistance to control.)
2. T6 (Forest - Survey Type 6).
3. B Fern (Bracken is principal item contributing to rate of spread.)
4. VM (Vine maple is principal item contributing to resistance to control.)
5. H% (50 to 75 percent slope.)

The standard abbreviations for fuel-type specifications were used on the fuel-type maps. The first two symbols, namely, rate of spread and resistance to control, define the type and will, of course, be the same throughout a type area. Any one or all of the remaining symbols may change within the type area; for example, an MM type area might have the following four sets of type designations:

MM	MM	MM	MM
T6	T6	T6	T7
Duff	Ferns	Moss	Ferns
Logs	Brush	Rock	Roots
L%	M%	H%	E%

Coloring maps. If the project requires maps, they will be colored according to the following scheme:

1. The rate of spread of each type area will be shown by outlining the area in the rate-of-spread color, and the resistance to control will be shown by coloring the area solid with the resistance-to-control color. In this way, the same color used for each rate-of-spread class is used for a corresponding resistance-to-control class. The colors used are as follows:

   a. Extreme.....Red.....Dixon's 321½
   b. High.....Orange....Dixon's 324
   c. Moderate....Blue.....Dixon's 320
   d. Low.....Green.....Dixon's 354½

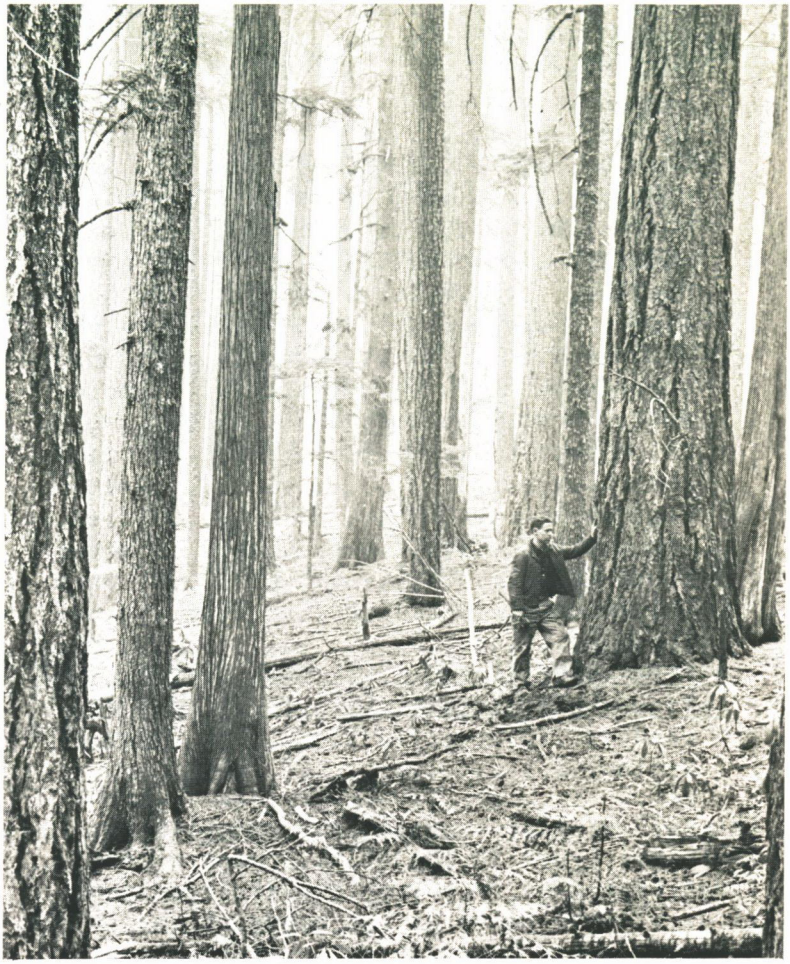
Abbreviations used for Cover Items Affecting Rate-of-Spread or Resistance-to-Control Fuel Type Maps:

Bark.....Bark
Bear Grass.....B. Grass
Bitterbruch.....Bitbr
Blackberry Vine.....BB. Vine
Bracken Fern.....B. Fern
Brush, Misc.....Brush
Ceanothus.....Cnths
Cones.....Cones
Devil Club.....Dev.Club
Dead Limbs.....Dd. Lmbs
Dogwood.....Dgwood
Elderberry.....Elber
Fireweed.....Fweed
Fern, Bracken.....B. Fern
Fern, Sword.....S. Fern

Grass.....Grass
Ground Moss.....Gr. Moss
Huckleberry.....Huber
Leaves.....Leaves
Litter.....Litter
Logs.....Logs
Mahogany.....Mhgny
Manzanita.....Mnzta
Mountain Alder.....M. Alder
Needles.....Ndls
Oregon Grape.....Ore. Gr
Rhododendron.....Rhod
Reproduction.....Reprod
Rotten Wood.....Rt. Wood
Salal.....Salal
Salmonberry.....Salber
Sagebrush.....Sagebr
Snowberry.....Snber
Sword Fern.....S. Fern
Thimbleberry.....Thber
Thistle.....Ths
Tree Moss.....Tr. Moss
Vine Maple.....Vn. Map
Weeds.....Weeds
Willow.....Will

The following photographs are examples of typical fuel types in Region 6, photos of fuel types developed by common silviculture practices will be added as the needs dictate. The fuel types are based on a Low Slope classification and this is not shown for each type.

Fuel types should be an integral part of our prevention planning, manning, and suppression action.



LL
D5
Litter
Duff

Moderate depth of litter, duff and rotten wood.

LL
FM4,SA
Duff
Duff

Thin litter and duff. Insufficient grass and weeds to carry fire.

LL
LP2
Litter
Litter

Thin litter and duff. Insufficient grass and weeds to carry fire.

LM
LP2
Litter
Logs

Thin litter of duff. Insufficient grass and weeds to carry fire.

LM
D3
Sword Fern
Brush

Sword fern 2-3 feet high. Clumps of vine maple and salmonberry brush. Moderately deep moss and duff. Few logs.

LH
H3s
Litter
Logs

Young hemlock and spruce. Green herbaceous ground cover with scant brush. Many logs and roots. Much rotten wood.

LE
D2,c,h
Bracken
Logs

Mostly dense shade. Small openings are a jungle of vine maple, salal and bracken. Many logs and much rotten wood. Many roots.

LE
H4,S4
Ground Moss
Logs

Deep rotten wood and duff. Sword fern, salmonberry and devil's club. Fire not likely to crown. Dense shade over most of area. Many dead, topped trees, snags and logs.

ML
P4
Grass
Grass

Few logs and snags.

ML
RP3
Needles (slash)
Small chunks

PP slash 2-years old.

ML
XO
Fireweed
Weeds

DF clear cut. Slash burned and area reburned. Few remaining logs and most of these can be avoided without appreciably lengthening the line.

ML
P1
Brush and Needles
800 to 1,000 stems/acre
Note openings. Grass Needles and Brush contribute to spread.

MM
PP1
Brush Needles
2,000 to 2,400 stems/acre

MM
LP2
Litter
Poles

Litter and scattered grass and weeds. Many standing and down dead poles.

MM
D1,h,c
Bracken
Logs

Bracken, weeds, and salal. Remains of unburned slash after clean logging 20 years ago. Logs mostly small and rotten.

MM
D4 D5
Litter
Logs

Undergrowth dying from shade of moderate overstory. Much dead twig, branch and stem wood on ground. Very little green ground cover except moss. Logs mostly small and rotten.

MM
RP3
Needles
Logs

Mixed LP & PP. Slash 1-year old.

MM
XC
Grass
Brush

Sparse grass, manzanita, and some bitterbrush in old slash burn.

MM
RP4
Brush
Brush

Cover of ceanothus and reproduction. Logs present.

MH
LP2
Limbs
Logs

Deep litter of twigs and branches in lodgepole deadening. Many logs.

MH
D2,c,ra
Bracken
Logs

A jungle of bracken, salal, and brush. Large short snags and many large logs.

ME
LP1
Logs
Logs

Mostly needles and twigs with some grass and weeds. Very few lodgepole pine snags standing. Many medium or small sized logs from previous killed stand.

ME
X
Slash
Logs

Douglas-fir cutover. Most of twigs are flattened on ground. Many small logs and a few large windfalls. Very few snags and mostly short and rotten.

HL
P4d
Grass
Sod

Continuous cover cheat-grass and other grass and weeds. Snags and logs absent or not important.

HM
RP4
Grass
Logs

PP slash 7-years old. Needles mostly fallen but draped on branches and twigs.

HH
J
Brush
Brush
Sage, bitterbrush, mahogany, juniper.

HH
RP3,p,lp
Needles
Logs (slash)
LP and PP slash 1-year old. Many logs.

HH
D1
Bracken
Logs

Bracken and grass in openings. Clumps of brush. Some reproduction. Few snags and large dead topped hemlock. Many small to medium-sized logs.

HH
LP1
Litter
Poles

Scant grass and weeds. Many small snags and logs.

HH
F
Litter
Logs

Second burn which killed reproduction on old burn. Dead poles, brush, bracken, weeds, vines, and clumps of brush. Few snags, many medium-sized short rotten logs.

HH
F
Litter
Logs

Second burn which killed reproduction on old burn. Dead poles, brush, bracken, weeds, vines, and clumps of brush. Few snags, many medium-sized short rotten logs.

HE
X
Slash
Logs

Unburned slash of recently cutover old growth Douglas-fir. Many large logs, broken tops, and poles. Few snags.

EL

G

Cheatgrass

Cheatgrass

Heavy stand grass-- occasional trees.

EM
X
Slash
Slash

Fresh PP slash practically clear cut. Also grass and weeds. Slash 2-feet deep and nearly all patches connected together. Logs scattered.

EH
RP3,p,wf
Slash
Slash

Fresh PP slash 2-feet deep in mixed PP and fir reproduction. Patches of ceanothus and other brush.

EH
P1

Continuous thinning slash and dead brush. Many small logs. Approximately 15 to 20 tons/acre.

EE
RW3,sp
Slash
Slash

Fresh SP slash with nearly all patches connected. Numerous logs close together and large limbs attached. Many standing and knocked-down poles surrounded by slash.

EE
P1

Continuous thinning slash. Many small down trees. 30 to 50 tons per acre.

EE
P4
Snags
Snags

PP burn 10-years old. Ground covered with short manzanita and ceanothus.

EE
X
Slash
Logs

Fresh DF and cedar slash. Fire would probably crown out in remaining green trees and spread sparks for considerable distance.

EE
D1
Snags
Snags, Logs

Thirty year old burn in dense stand of large Douglas-fir. Many logs. Douglas-fir reproduction, brush, bracken, weeds, and vines.

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